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OBSERVATIONS ON THE ROLE OF THE REACTIVITY OF GREAT GERBILS TO P. PESTIS DURING THE DEVELOPMENT OF THE EPIZOOTOLOGICAL PROCESS

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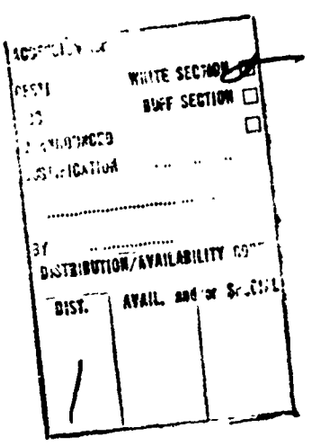

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OBSERVATIONS ON THE ROLE OF THE REACTIVITY OF GREAT GERBILS TO P. PESTIS DURING THE DEVELOPMENT OF THE EPIZOOTOLOGICAL PROCESS

Report II. Dynamics of the Hemagglutinins in the Great Gerbils after a Primary Contact with P. pestis. (Alma-Ata; Taldy-Kurgan)

[Following is the translation of an article by L. A. Peysakhis, A. G. Stogova, N. F. Lopatina, N. A. Sukharnikova, and N. F. Tarakanov, published in the Russian-language periodical Materialy Nauchnoy Konferentsii po Prirodnoy Ochagovosti i Profilaktike Chumy (Materials from the Scientific Conference on the Natural Focalness and Prophylaxis of Plague), Alma-Ata, Feb., 1963, pages 173--175. Translation performed by Sp/7 Charles T. Ostertag, Jr.]

Recently interest has grown in the study of the feasibility of using the passive hemagglutination reaction (RPGA) in the field diagnosis of plague. It must be stressed that a correct evaluation of the status of this or that territory with the help of this method is possible only on the basis of a knowledge of the role and development of hemagglutinins in the organism of the main secondary carriers of the infection, and the appearance, build up and dying away of these antibodies in the various phases of the infection and epizootic processes.

The present report is devoted to revealing the regularities in the dynamics of hemagglutinins in great gerbils -- the main carriers of the plague microbe in the Central Asian desert plague focus -- after their initial contact with the causative agent.

In December 1961 on the territory of Lyuk Kum (Vostochnoye Pribalkhash), which is outside of the enzootic zone, 100 adult great gerbils were captured. Before setting up the experiment the blood of all the animals was investigated for the presence of specific hemagglutinins and a negative result was obtained. Then all the gerbils were divided into four groups of 25 animals each and correspondingly infected subcutaneously with the plague microbe in doses of 10^1, 10^3, 10^5, and 10^7 microbial bodies. In the tests we used plague microbe strain No 31, which is related to the gerbil variety and possesses a stable virulence (the DCL for guinea pigs is 100 microbial bodies). In all the infected animals several drops of blood (from an incision on the tail) were taken periodically (during the first month after three, and during the second month after five, and then ten days) and investigated for hemagglutinins. In

setting up the RPGA we used the diagnostic agent proposed by M. I. Levi. This agent is the erythrocytes of sheep with the plague microbe fraction IA adsorbed on them.

As indices of the dynamics of antibodies in the blood of the gerbils we took into consideration the percentage of positively reacting animals, the average harmonic indices of the titers and their individual variations. The test animals were kept under observation for six months following infection.

Following infection with a dose of 10 microbial bodies, antibodies were not recorded in the blood of the gerbils up to 28 days. The maximum of antibodies was detected in 33 days and their complete disappearance was recorded by the 53rd day following infection. The average titers in various periods of time fluctuated within the limits from 1:79 up to 1:320, and individually from 1:40 up to 1:320.

With an infection dose of 1,000 microbial bodies the appearance of antibodies in individual cases was recorded in 6--12 days (titers of from 1:40 up to 1:320). Then the number of positively reacting gerbils increased up to 93 percent, with average titers from 1:40 up to 1:190 and individual fluctuations from 1:40 up to 1:1280. The disappearance of antibodies in the blood in this group of gerbils was noted by the 53rd day following infection.

When the gerbils were infected with a dose of 100,000 microbial bodies the appearance of antibodies was noted after six days with a gradual increase in the percentage of positively reacting animals by the 28--33rd day and a stabilization of it at a level of 70% by the 43rd day. The average titer of antibodies in this period fluctuated in various periods within the limits from 1:170 up to 1:955, and individually from 1:160 up to 1:5120. The complete disappearance of a reaction with this dose of infection was noted by the 63rd day.

Following infection with a dose of 10,000,000 microbial bodies the appearance of the first antibodies was recorded in six days. If in the previous group of gerbils during the first 12 days following infection the maximum titer of antibodies was equal to 1:160, then here it reached 1:1280. From 18 up to 43 days inclusively the percentage of positively reacting gerbils fluctuated from 60 up to 100, and the average titer -- from 1:257 up to 1:1698 with a maximum individual deviation up to 1:10240. Starting with 53 days the dying off of the reaction was noted with a complete disappearance of antibodies from the blood by 63 days.

A subsequent check of the blood of the gerbils, which had initial contact with the plague microbe, yielded a negative result to the presence of antibodies up to 181 days.

An analysis of individual indices of antibodies in the blood of great gerbils, infected with small doses of the plague microbe (10^1 and 10^3 microbial bodies), showed that in some of the animals antibodies were not recorded in general during the whole period of observation, and in a certain part following the initial appearance they disappeared rapidly and then reappeared again. In the groups of gerbils, infected with large doses of plague microbe, the individual titers varied sharply in the same periods.

The work carried out makes it possible to make the following conclusions. As a result of the single administration to great gerbils of even very small doses of the plague microbe, the production of specific antibodies took place. This indicates the very susceptibility of the animals to the plague microbe.

In the dynamics of hemagglutinins in gerbils, infected with various doses of causative agent, especially with large doses, three periods are expressed -- accumulation, stabilization, and dying off.

The average and individual titers of antibodies in the blood of great gerbils are found in dependency on the magnitude of the infecting dose.

The maximum indices of hemagglutinins in great gerbils following initial contact with the plague microbe with all the infecting doses were recorded in the post infection period.

Together with the regularities in the development of hemagglutinins following initial contact with the plague causative agent which are common for great gerbils, there is a clearly expressed factor of individuality. which in general is typical for this species of the main carriers.

*Presented in November 1962 at the Scientific Conference of the Rostov State Scientific-Research Antiplague Institute.